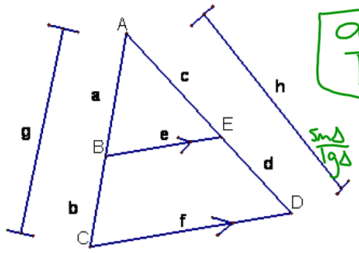
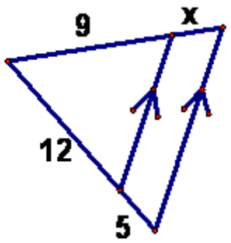
6.4 Parallel lines and proportional parts

Theorem 6.4-Triangle Proportionality Theorem -If a line is parallel to one side of a triangle and intersects the other two sides in two distinct points, then it separates these sides into segments of proportional lengths.



$\frac{a}{b} = \frac{c}{d}$

SAS $\frac{e}{f} = \frac{g}{g} = \frac{c}{h}$



$\frac{12}{5} = \frac{9}{x}$

$x = 3\frac{3}{4}$

$\frac{12}{x} = \frac{8}{3}$

$x = 4.5$

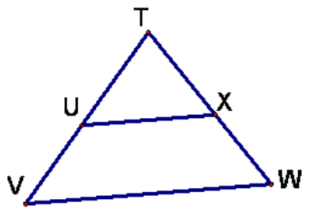
SAS $\frac{6}{4} = \frac{3}{11}$

$y = 22$

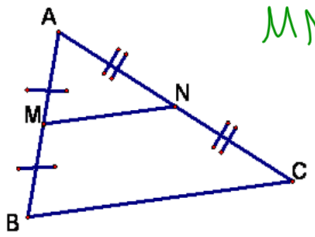
Theorem 6.5-Converse of the triangle proportionality Theorem
If a line intersects two sides of a triangle and separates these sides into segments of proportional length then the line is parallel to the third side.

If $\frac{TU}{UV} = \frac{TX}{XW}$

then $\overline{UX} \parallel \overline{VW}$

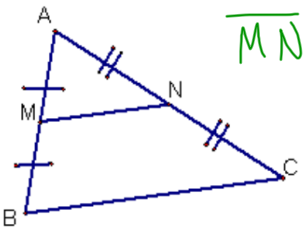


Midsegment -of a triangle is a segment whose endpoints are the midpoints of two sides of a triangle.



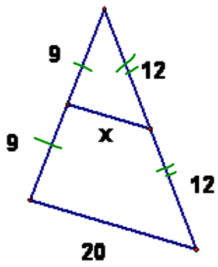
$\overline{MN}$ is a midsegment

Theorem 6.6-Triangle Midsegment theorem -A midsegment of a triangle is parallel to one side of the triangle, and its length is ½ the length of that side.



$\overline{MN} \parallel \overline{BC}$

$MN = \frac{1}{2} BC$



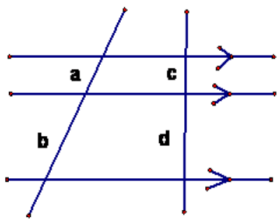
$x = \frac{1}{2} 20$

$x = 10$

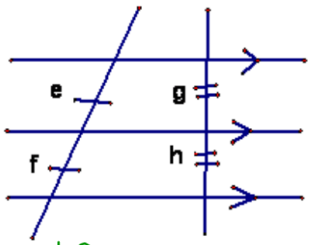
$\frac{9}{18} = \frac{x}{20}$

Corollary 6.1-If three or more parallel lines intersect two transversals, then they cut the transversals proportionally

Corollary 6.2-If three or more parallel lines cut off congruent segments on one transversal, then they cut off congruent segments on every transversal.

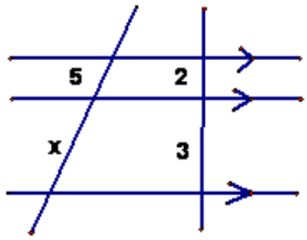


$\frac{a}{b} = \frac{c}{d}$



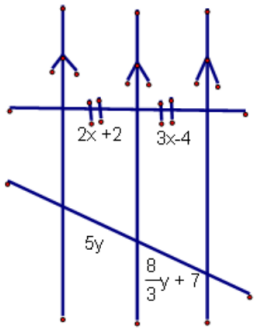
If $e = f$

then $g = h$



$\frac{5}{x} = \frac{2}{3}$

$x = 7\frac{1}{2}$



$2x + 2 = 3x - 4$

$6 = x$

$3\left[5y = \frac{8}{3}y + 7\right]$

$15y = 8y + 21$

$7y = 21$

$y = 3$

6.5

Parts of Similar Triangles

Ex:

Scale factor 1:2

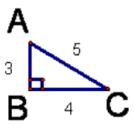
ΔABC P= 12

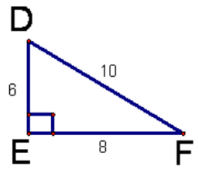
ΔDEF P= 24

Ratio of perimeters

12:24

1:2

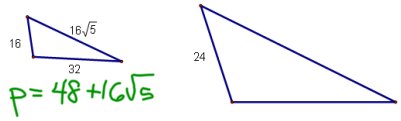




Theorem 6.7-Proportional Perimeters Theorem -If two triangles are similar, then the perimeters are proportional to the measures of the corresponding sides.

The △s are ~.

Find the perimeter of the larger △



$P = 48 + 16\sqrt{5}$

$\frac{16}{24} = \frac{2}{3}$

$\frac{2}{3} = \frac{48+16\sqrt{5}}{P}$

$2P = 3(48+16\sqrt{5})$

$\frac{2P}{2} = \frac{144+48\sqrt{5}}{2}$

$P = 72 + 24\sqrt{5}$

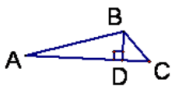
Special segments of similar triangles

Theorem 6.8-If two triangles are similar, then the measures of the corresponding **altitudes** are proportional to the measures of the corresponding sides.

Theorem 6.9-If two triangles are similar, then the measures of the corresponding **angle bisectors** are proportional to the measures of the corresponding sides.

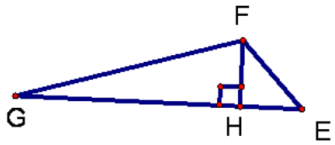
Theorem 6.10-If two triangles are similar, then the measures of the corresponding **medians** are proportional to the measures of the corresponding sides.

Thm. 6.8



$\triangle ABC \sim \triangle GFE$

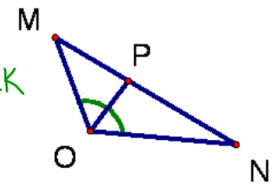
$\frac{BD}{FH} = \frac{AB}{GF}$



Thm. 6.9

$\triangle MON \sim \triangle ILK$

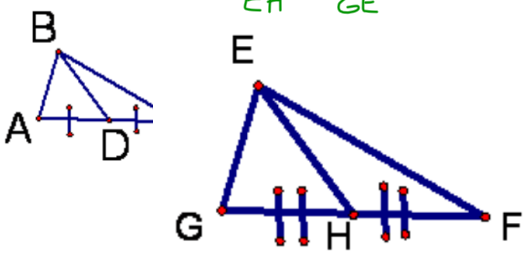
$\frac{OP}{LJ} = \frac{MO}{IL}$



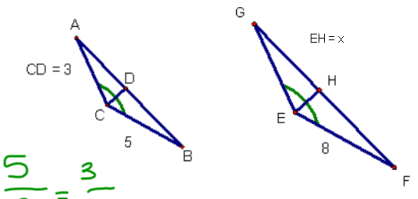
Thm 6.10

$\triangle ABC \sim \triangle GEF$

$\frac{BD}{EH} = \frac{AB}{GE}$



$\triangle ABC \sim \triangle GFE$ What is EH?



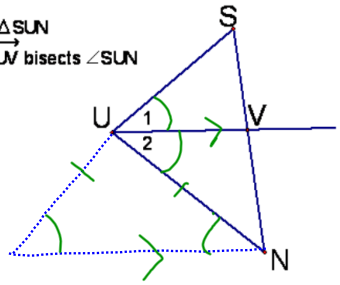
$\frac{5}{8} = \frac{3}{x}$

$4\frac{4}{5} = x$

Theorem 6.11-Angle Bisector Proportion Theorem -an angle bisector in a triangle separates the opposite side into segments that have the same ratio as the other two sides.

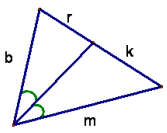
$\triangle SUN$

$\overrightarrow{UV}$ bisects $\angle SUN$

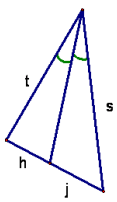


$\frac{SV}{VN} = \frac{SU}{UN}$

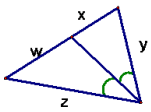
or $\frac{SV}{SU} = \frac{VN}{UN}$



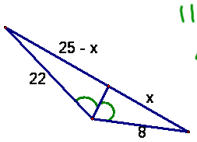
$\frac{r}{k} = \frac{b}{m}$



$\frac{h}{j} = \frac{t}{s}$



$\frac{w}{x} = \frac{z}{y}$



$\frac{11}{4} = \frac{25-x}{x}$

$4(25-x) = 11x$

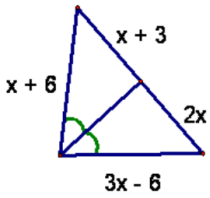
$100 - 4x = 11x$

$100 = 15x$

$\frac{100}{15} = x$

$\frac{20}{3} = x$

$6\frac{2}{3} = x$



$\frac{x+3}{x+6} = \frac{2x+1}{3x-6}$

$(x+3)(3x-6) = (2x+1)(x+6)$

$3x^2 - 6x + 9x - 18 = 2x^2 + 12x + x + 6$

$3x^2 + 3x - 18 = 2x^2 + 13x + 6$

$x^2 - 10x - 24 = 0$

$(x-12)(x+2) = 0$

$x = 12$ $x = -2$

HW

p312-313 #s 14-21, 33, 34

p320-321 #s 10, 11, 14, 22-24